REMARKS

Applicant's undersigned counsel thanks the Examiner for the careful consideration given the application. Claim 1 has been amended and new claim 13 has been added in this amendment. A declaration from inventor Hannu Leino is enclosed. A declaration from Gunilla Ostberg, first listed author of the cited "Use of Carbon Dioxide in the Production of Sulphate Pulp" reference is also enclosed. A page from "Papermaking Part 1, Stock Preparation and Wet End", containing a definition of "stock preparation", is also enclosed.

The Examiner has rejected claims 1-8 and 10-12 under 35 U.S.C. 102(b) as anticipated by Ostberg et al. ("Use of Carbon Dioxide in the Production of Sulphate Pulp"). In the alternative, the Examiner rejected claims 1-8 and 10-12 under 35 U.S.C. 103(a) as obvious over Ostberg. Ostberg sets forth the advantages of adding carbon dioxide (CO_2) to the wash water in a fiber plant. The Examiner has stated that Ostberg on page 515 shows adding alkali, e.g. sodium hydroxide, to the pulp to adjust the pH in combination with carbon dioxide to buffer the pH to a pH of 8.0.

In her declaration Ostberg explains that pages 513 to 515 describe the production of unbleached production of unbleached pulp in fiber line 2 of the mill. She notes that prior to the test runs with carbon dioxide washing, the mill had been using alkali to adjust the pH of the unbleached pulp to about 9 to 9.5. She further explains that the test runs showed that carbon dioxide stabilized the pH without the addition of alkali. Ostberg specifically points out that the carbon dioxide added for the washing replaced the prior use of alkali (NaOH) and that there was no addition of both alkali (NaOH) and carbon dioxide to the unbleached pulp. See Ostberg declaration, paragraphs 10-14.

Thus, when Ostberg states that "[t]he pH of the pulp was around 9 -9.5 before the addition of CO2" on page 513 of Sulphate Pulp, this does not indicate that both alkali metal hydroxide were added to the pulp. Rather, the pH of the pulp was 9-9.5 when alkali metal hydroxide was added, or the pH of the pulp was 8 when the carbon dioxide was added. Sulphate Pulp therefore does not show addition of a combination of feeds (alkali metal hydroxide and carbon dioxide) as required by claim 1. For this reason, claim 1 as amended defines over Sulphate Pulp (the Ostberg reference).

The remainder of Ostberg's declaration explains the differences between the tests run in the bleached and unbleached pulps of fiber lines 1 and 2 in the fiber plant of the paper mill.

A declaration from Hannu Leino is also enclosed. The declaration provides further detail regarding the processes detailed in the Sulphate Pulp article as compared with the process according to the present invention. In particular, the Leino declaration notes that the alkalinity (buffering ability) of the pulp according to the process according to the Sulphate Pulp article is greatly reduced due to the removal of water in the Sunds press. This removal of water also withdraws dissolved bicarbonate ions which provide the alkalinity. See Leino declaration, pages 3 and 4. The removal of water in the Sunds press allows the it to be recycled to an earlier point in the fiber mill, while the pressed pulp passes to the paper mill, where the "stock preparation" occurs.

It is important define the term "stock preparation" in this context. In the papermaking art, "[s]tock preparation or 'stock prep' includes mechanical treatment of the stock before the machine chest, proportioning, and blending of the main stock components. Stock preparation *begins with repulping or the dilution of pulp from integrated mill operations* at the pulp storage towers and ends at the machine chest." (Emphasis added) See "Papermaking Part 1, Stock Preparation and Wet End", page. XX, copy enclosed.

This definition shows that the stock preparation takes place after the removal of water in the Sunds press and begins with the repulping or dilution of this pulp. The processes described in the Sulphate Pulp reference take place before the stock preparation begins. Claim 1 as amended requires that the alkali metal hydroxide feed and the carbon dioxide feed are added to the pulp suspension in the stock preparation phase of the papermaking process. As noted previously, the Sulphate Pulp reference does not teach or suggest adding a combination of alkali metal hydroxide and carbon dioxide to the pulp suspension. The Sulphate Pulp reference also fails to show addition of these feeds in combination in the stock preparation. For this additional reason, claim 1 as amended defines over the Sulphate Pulp reference.

Additionally, the Leino declaration notes that the pulp leaving the fiber plant has very low alkalinity (buffering ability), both under conventional processes or under the "AGA Pulp Wash system" disclosed in the Sulphate Pulp reference. By contrast, the pulp suspension treated in accordance with the claim 1 must be treated with both alkali metal hydroxide and carbon dioxide "sufficient to achieve a significant buffering effect" such that the pH of the pulp suspension is maintained "at a desired level from the addition of the feeds through the

formation of paper on the paper machine." As the Leino declaration describes, the alkalinity (buffering ability) of the pulp, as measured by mmol/l of bicarbonate ion, is approximately 8-12 mmol/l using the process of the present invention, whereas conventional processes and the process described in Sulphate Pulp result in alkalinity of approximately 1.0 mmol/l. The low alkalinity of these latter processes is not a "significant buffering effect" sufficient to maintain "the pH at a desired level from the addition of the feeds through the formation of paper on the paper machine" as required by claim 1. For this additional reason, claim 1 as amended defines over the Sulphate Pulp reference.

The Examiner has also rejected claims 1-12 under 35 U.S.C. as obvious over Ostberg in view of GB 815,247. The Examiner points to the statement in '247 that NaOH can be added to a slurry before adding CO_2. GB 815,247 does not, however, teach or suggest a significant buffering effect that lasts throughout the paper making process. Furthermore, any buffering achieved at this point in the '247 reference is overcome in the subsequent bleaching and acidification steps. (See page 2, lines 51-112, especially lines 103-107.) Thus the '247 reference actually teaches away from the claimed invention, a process that creating a significant buffering effect that lasts throughout the paper making process. For these reasons, claim 1 defines over the combination of Ostberg and GB 815,247. Claims 2-12 depend from claim 1 and so are also allowable.

As all rejections from the Office action have now been addressed, applicant respectfully submits that the application is in condition for allowance. A notice of allowance is therefore respectfully requested. If there are any fees required by this communication not covered by an enclosed check, please charge such fees to our Deposit Account No. 16-0820, order No. 32107.

Respectfully submitted,
PEARNE & GORDON LLP

By _____
Brian Alan Bargmeyer, Reg. No. 47404

526 Superior Avenue East, Suite 1200
Cleveland, Ohio 44114
(216) 579-1700

Date: 12/23/02

Version of claim 1 showing changes

1. (Twice amended) A process for stabilizing the pH of a pulp suspension [in the stock preparation of a paper machine] at a desired pH level, characterized by increasing the alkalinity of said paper making pulp suspension by adding thereto in the stock preparation of a paper machine a combination of an alkali metal hydroxide feed and a carbon dioxide feed, each of said feeds being added in an amount greater than what would be required to only adjust the pH of the suspension to the desired pH level, which feeds substantially counter each other's pH changing effect, said feeds being provided in an amount sufficient to achieve a significant buffering effect of said pulp suspension while enabling utilization of an excess of said hydroxide or said carbon dioxide for adjusting the pH of said pulp suspension and maintaining the pH at a desired level from the addition of the feeds through the formation of the paper on the paper machine.

Book 8

Papermaking Part 1, Stock Preparation and Wet End

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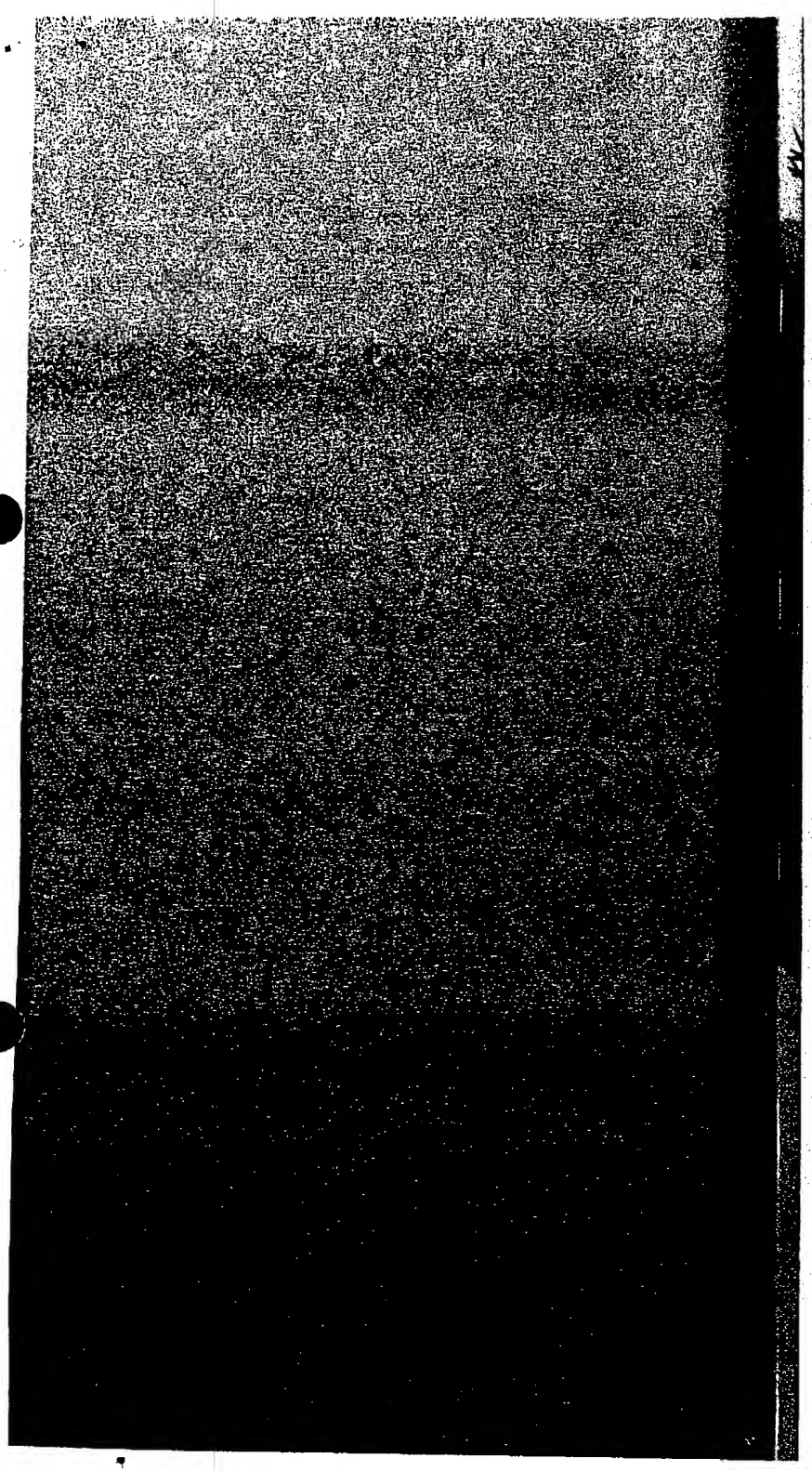

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Stock and water systems of the paper machine

1 Definitions

The following terms are commonly used to specify certain areas and systems as part of the entire paper mill water system:

Short circulation: The system in which paper machine wire water is separated from the stock in web forming and used for dilution of the thick stock to be delivered to the headbox.

Long circulation: The system in which excess white water from the short circulation and other waters are collected at the paper machine (PM) and used for stock dilution and other purposes in stock preparation. Within the long circulation loop, usually fiber recovery and water cleaning equipment is installed.

Approach flow system: The system extends from the machine chest to the headbox lip. The main purpose is to meter and dilute the stock including blending with other components like fillers, chemicals, and additives unless not already added in stock preparation: Then, the low-consistency stock is pumped and screened before feeding to the headbox. Stock cleaning by hydrocyclones and deaeration can be included.

Stock preparation: Stock preparation or "stock prep" includes mechanical treatment of the stock before the machine chest, proportioning, and blending of the main stock components. Stock preparation begins with repulping or the dilution of pulp from integrated mill operations at the pulp storage towers and ends at the machine chest.

2 Design principles

2.1 Elements and operations

The purpose of the stock and water systems is to supply the paper machine (PM) with stock and water in such way that

- The quantity of supplied stock is sufficient for the production capacity of the PM
- The supply is even and of such quality in order to reach a high PM productivity
- The product at the reel meets the given quality parameters.